

R E M A R K S / A R G U M E N T S

Reconsideration of the present application, as amended, is respectfully requested.

The April 7, 2004 Office Action and the Examiner's comments have been carefully considered. In response, the Abstract of the Disclosure, specification and claims are amended, claims are added, and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

SPECIFICATION

In response to the Examiner's comments relating to the Abstract, the Abstract is amended to more clearly comply with the requirements for an Abstract. The revised Abstract is submitted on a separate sheet herewith.

The detailed description has been amended as suggested by the Examiner to overcome the objection thereto.

In view of the amendments to the specification, reconsideration and withdrawal of the objection thereto are respectfully requested.

CLAIM OBJECTIONS

In the Office Action, claim 3 is objected to because of certain informalities. In response, claim 3 is amended to overcome the objection thereto. In view of the amendment of claim 3, reconsideration and withdrawal of the objection to claim 3 are respectfully requested.

REJECTION UNDER 35 USC 112

In the Office Action, claims 3-8 are rejected under the second paragraph of 35 USC 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In response, claims 3, 4 and 7 are amended in a sincere effort to overcome the indefiniteness rejection. In view of the amendment of claims 3, 4 and 7, reconsideration and withdrawal of the rejection of claims 3-8 are respectfully requested.

REJECTION UNDER 35 USC 101

In the Office Action, claims 20 and 21 are rejected under 35 USC 101 because the Examiner contends that the claimed invention is directed to non-statutory subject matter. In response, claims 20 and 21 are amended along the lines suggested by the Examiner. In view of the amendment of claims 20 and 21, reconsideration and

withdrawal of the rejection of claims 20 and 21 under 35 USC 101 are respectfully requested.

PRIOR ART REJECTIONS

In the Office Action claims 1-3, 5, 6, 8-11, 13, 14, 16-18, 20 and 21 are rejected under 35 USC 102(b) as being anticipated by USP 5,715,822 (Watkins et al.). Claims 1-3, 5-12, 16-18, 20 and 21 are rejected under 35 USC 102(b) as being anticipated by the article by Leung et al. Claims 4, 7, 15 and 19 are rejected under 35 USC 103 as being unpatentable over Watkins et al. in view of USP 6,397,094 (Lüdeke et al.).

In response, the claims are amended in a sincere effort to more clearly define the present claimed invention over the cited references. In this regard, claim 3 has been rewritten in independent form so that claims 1 and 3 are now independent claims. Claims 4-8 depend from claim 3 and claims 9-21 depend from claim 1.

With respect to claims 1 and 9-21, claim 1 is directed to a magnetic resonance method for localizing an interventional instrument on which at least one microcoil is provided which includes the steps of generating a magnetic resonance signal in an examination zone by means of a single non-selective RF pulse, detecting the magnetic resonance signal via the microcoil and under the influence of magnetic field gradients by generating two

or more gradient pulses having a respective linearly independent spatial direction in temporal succession without intermediate application of further RF pulses between temporally adjacent gradient pulses, and determining the position of the microcoil in the relevant spatial direction from the frequency of the magnetic resonance signal during each gradient pulse.

This embodiment of the invention is shown in Fig. 2a wherein a single non-selective RF pulse 7 is generated, with each gradient pulse 9, 12, 13 following this RF pulse. The nuclear magnetization is dephased only slowly because the sensitivity of the microcoil is limited to its immediate surrounding. Since only a single RF pulse is generated for all of the gradient pulses, the duration of the localization sequence is reduced (see the specification at page 4, lines 10-16).

Watkins et al. and Leung et al. do not disclose, teach or suggest the generation of a single non-selective RF pulse and therefore cannot anticipate the embodiments of the invention set forth in claim 1 and claims 9-21 which depend therefrom.

Watkins et al. describes the use of an RF coil attached to an interventional instrument. There is no disclosure, teaching or suggestion of timing RF pulses and gradient pulses so that a single RF pulse is followed by two or more gradient pulses.

Leung et al. describes the generation of a plurality of non-selective RF pulses, one for each gradient-recalled echo (GRE) so

that a total of six excitations are required when two GREs using opposite polarity readout gradients are generated for each orthogonal axis (see page 1266).

With respect to claims 3-8, claim 3 is directed to a method of imaging blood vessels which includes the steps of providing a catheter with at least one microcoil, inserting the catheter into the blood vessel of a patient to be examined, detecting the position of the catheter during movement thereof with each detection step comprising generating a magnetic resonance signal in an examination zone by means of a non-selective RF pulse, detecting the magnetic resonance signal via the at least one microcoil and under the influence of magnetic field gradients by generating two or more gradient pulses having a respective linearly independent spatial direction in temporal succession, and determining the position of the at least one microcoil in each spatial direction from the frequency of the magnetic resonance signal during each gradient pulse, and reproducing the intensity of the detected magnetic resonance signal in association with the detected catheter position. The reproducing step comprises variably displaying the intensity of the detected magnetic resonance signal to provide a detected magnetic resonance signal with a higher signal intensity differently than a detected magnetic resonance signal with a lower signal intensity so that the presence and position of a stenosis

restricting the blood vessel is visualized since the volume of blood in the blood vessel is indicated by the intensity of the detected magnetic resonance signal.

As described in the specification, e.g., at page 11, lines 6-21, the position of the catheter equipped with a microcoil is tracked and the intensity of the magnetic resonance signal obtained is plotted as a function of the catheter position (see Figs. 3 and 4). However, to enable the detection of a stenosis, the intensity must be variably displayed because a lower signal intensity, relative to the signal intensity at other portions of the blood vessel, is an indication of a constriction in the blood vessel. Otherwise, if the signal intensity were uniformly displayed, only the position of the catheter would be visible.

Watkins et al. and Leung et al. do not disclose variably displaying the intensity of a magnetic resonance signal generated by a microcoil on an interventional instrument to enable the detection of the presence and position of a stenosis in a blood vessel in which the interventional instrument is located. Watkins et al. and Leung et al. do not even recognize that a lower intensity signal may be indicative of a stenosis.

In view of the foregoing, independent claims 1 and 3 are patentable over Watkins et al. and Leung et al. when taken either alone under 35 USC §102 or in combination under 35 USC §103(a).

The other references of record do not close the gap between the present claimed invention as defined by claims 1 and 3 and Watkins et al. and Leung et al.

Therefore, claims 1 and 3 are patentable over all of the references of record under 35 USC 102 as well as 35 USC 103.

Claims 3 and 4-21 are either directly or indirectly dependent on claims 1 or 3 and are patentable over the references of record in view of their dependence on claims 1 or 3 and because the references of record do not disclose, teach or suggest each of the limitations set forth in claims 2 and 4-21.

NEW CLAIMS

New claims 22 and 23 are added to the present application. Claims 22 and 23 are dependent on claim 3 and further define the method of claim 3.

Submitted herewith is a check in the amount of \$36.00 for two (2) additional dependent claims above the highest number of dependent claims for which payment was previously made. If any additional fees are due or if any overpayment has been made, please charge or credit Deposit Account No. 14-1270 for such sum.

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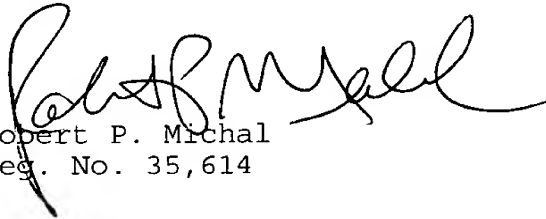
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Reply to Office Action dated April 7, 2004

If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

Entry of the amendment, allowance of the claims, and the passing of the application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



Robert P. Michal
Reg. No. 35,614

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Frishauf, Holtz, Goodman & Chick, P.C.
767 Third Avenue - 25th Floor
New York, New York 10017-2023
Tel. No. (212) 319-4900
Fax No. (212) 319-5101
RPM/ms